

## CLAIMS

1. A combined switch and service processor module for a modular computer system, comprising:
  - 5 a switch portion;
  - a service processor portion;
  - a data interface for communicating management information to other parts of the modular computer system;

wherein the service processor portion is operable to operate in master/slave

10 relationship with a service processor portion of a further combined switch and service processor module of the modular computer system; and

wherein the service processor portion is further operable automatically to synchronise management information with the service processor portion of the further combined switch and service processor via the data interface in accordance with the

15 master/slave relationship.
2. The combined switch and service processor module of claim 1, further comprising an external data interface for communication with an external management entity.
- 20 3. The combined switch and service processor module of claim 2, wherein only the service processor portion of the combined switch and service processor module configured as master communicates with the external management entity.
- 25 4. The combined switch and service processor module of claim 1, wherein the switch portion operates in a peer to peer relationship with a switch portion of the further combined switch and service processor.
- 30 5. The combined switch and service processor module of claim 4, wherein the switch portion of one combined switch and service processor module is configured as a configuration master for the peer to peer relationship.

6. The combined switch and service processor module of claim 5, wherein the service processor portion of the combined switch and service processor module having the switch portion configured as configuration master is operable automatically to cause synchronisation of operation parameters of switch portions of  
5 further combined switch and service processor modules to the operation parameters of the configuration master switch portion.

7. The combined switch and service processor module of claim 6, wherein at least one of said further combined switch and service processor modules is located in  
10 a modular computer system physically distinct from a modular computer system in which the combined switch and service processor is located.

8. The combined switch and service processor module of claim 6, wherein the operation parameters include at least one of: read permissions for a data processing  
15 entity addressable via the switch portion, write permissions for a data processing entity addressable via the switch and broadcast family groups definitions for data processing entities addressable via the switch portion.

9. The combined switch and service processor module of claim 1, wherein the  
20 switch portion and service processor portion are implemented by separate hardware within the module.

10. The combined switch and service processor module of claim 1, wherein the switch portion and service processor portion are implemented by common hardware  
25 within the module.

11. The combined switch and service processor module of claim 1, wherein software controlling the functionality of the switch portion and the service processor portion runs on a common operating system.  
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12. The combined switch and service processor module of claim 1, wherein the switch and service processor portions are each operable to communicate with the

external management entity to obtain a unique address within a computing environment into which the modular computer system is connected.

13. The combined switch and service processor module of claim 1, wherein the 5 service processor portion has a user interface (701) and wherein the service processor portion user interface is operable to receive and forward communications between the external management entity and the switch portion.
14. The combined switch and service processor module of claim 1, wherein the 10 switch and service processor elements are each operable to create a unique identifier using data unique to the respective processor; and  
wherein the service processor element is operable to supply its unique identifier to the switch for use by the switch in identifying itself in precedence to the switch's own unique identifier.
15. The combined switch and service processor module of claim 1, further comprising a fault management unit; and wherein the fault management unit is operable to intercept any fault messages generated by the switch portion and the service processor portion and to perform rationalisation processing on those messages 20 to determine whether to forward a given message to the external management entity.
16. A modular computer system comprising the combined switch and service processor module of claim 1 removably received therein.
- 25 17. A computer racking system comprising the modular computer system of claim 16.
18. A modular computer system chassis having:  
an aperture for removably receiving therein an information processing 30 cartridge having at least one processor and a memory;  
an aperture for removably receiving therein the combined switch and service processor module of claim 1; and  
an aperture for removably receiving therein a power supply module.

19. A computer racking system comprising the modular computer system chassis of claim 18.

5 20. A method of operating a combined switch and service processor module for a modular computer system, the combined switch and service processor module having: a switch portion; a service processor portion; and a data interface for communicating management information to other parts of the modular computer system; the method comprising:

10 operating the service processor portion in master/slave relationship with a service processor portion of a further combined switch and service processor module of the modular computer system; and

15 operating the service processor portion automatically to synchronise management information with the service processor portion of the further combined switch and service processor via the data interface in accordance with the master/slave relationship.

21. A combined switch and service processor module for a modular computer system, comprising:

20 a switch portion;  
a service processor portion;  
a data interface for communicating with an external management entity;  
wherein the switch and service processor portions are each operable to communicate with the external management entity to obtain a unique address within a  
25 computing environment into which the modular computer system is connected.

22. The combined switch and service processor module of claim 21, wherein the unique address is an Internet Protocol address.

30 23. The combined switch and service processor module of claim 21, wherein the switch and service processor portions use a dynamic host configuration protocol to obtain the unique address.

24. The combined switch and service processor module of claim 21, wherein each of the switch and service processor portions uses an identifier including a part unique to the modular computer system in which the module is received for obtaining the unique address.

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25. The combined switch and service processor module of claim 21, wherein the service processor portion obtains the identifier part unique to the modular computer system from an identifier store in the modular computer system and subsequently passes that identifier part to the switch portion.

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26. The combined switch and service processor module of claim 21, wherein each of the switch and service processor portions uses an identifier including a part unique to the combined switch and service processor module for obtaining the unique address.

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27. The combined switch and service processor module of claim 21, wherein each of the switch and service processor portions uses an identifier including a part unique to the respective portion for obtaining the unique address.

20 28. The combined switch and service processor module of claim 21, wherein the switch portion and service processor portion are implemented by separate hardware within the module.

25 29. The combined switch and service processor module of claim 21, wherein the switch portion and service processor portion are implemented by common hardware within the module.

30 30. The combined switch and service processor module of claim 21, wherein the service processor portion is operable to operate in master/slave relationship with a service processor portion of a further combined switch and service processor module of the modular computer system; and

wherein the service processor portion is further operable automatically to synchronise management information with the service processor portion of the further

combined switch and service processor via the data interface in accordance with the master/slave relationship.

31. The combined switch and service processor module of claim 21, wherein the  
5 service processor portion has a user interface (701) and wherein the service processor  
portion user interface is operable to receive and forward communications between the  
external management entity and the switch portion.

32. The combined switch and service processor module of claim 21, wherein the  
10 switch and service processor elements are each operable to create a unique identifier  
using data unique to the respective processor; and

wherein the service processor element is operable to supply its unique  
identifier to the switch for use by the switch in identifying itself in precedence to the  
switch's own unique identifier.

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33. The combined switch and service processor module of claim 21, further  
comprising a fault management unit; and wherein the fault management unit is  
operable to intercept any fault messages generated by the switch portion and the  
service processor portion and to perform rationalisation processing on those messages  
20 to determine whether to forward a given message to the external management entity.

34. A modular computer system comprising the combined switch and service  
processor module of claim 21 removably received therein.

25 35. A computer racking system comprising the modular computer system of claim  
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36. A modular computer system chassis having:  
an aperture for removably receiving therein an information processing  
30 cartridge having at least one processor and a memory;  
an aperture for removably receiving therein the combined switch and service  
processor module of claim 21; and  
an aperture for removably receiving therein a power supply module.

37. A computer racking system comprising the modular computer system chassis of claim 36.

5 38. A method of operating a combined switch and service processor module for a modular computer system, the combined switch and service processor module having: a switch portion; a service processor portion; and a data interface for communicating with an external management entity; the method comprising:

10 operating the switch and service processor portions to communicate with the external management entity to obtain a unique address within a computing environment into which the modular computer system is connected.

39. A combined switch and service processor module for a modular computer system, comprising:

15 a switch portion;  
a service processor portion having a user interface;  
a physical data interface for communicating with an external management entity;  
wherein the service processor portion user interface is operable to receive and  
20 forward communications between the external management entity and the switch portion.

40. The combined switch and service processor module of claim 39, wherein the service processor portion is operable to perform an authentication operation as part of  
25 establishing a communications link with the external management entity.

41. The combined switch and service processor module of claim 40, wherein the authentication operation can be performed for a communications link between the external management entity and both of the switch and service processor portions.

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42. The combined switch and service processor module of claim 39, wherein the service processor portion is operable to perform a cryptographic operation as part of establishing a communications link with the external management entity.

43. The combined switch and service processor module of claim 42, wherein the cryptographic operation can be performed for a communications link between the external management entity and both of the switch and service processor portions.

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44. The combined switch and service processor module of claim 39, wherein the service processor portion user interface is configured to respond as a combined user interface for the service processor portion and switch portion.

10 45. The combined switch and service processor module of claim 39, wherein the switch portion and service processor portion are implemented by separate hardware within the module.

15 46. The combined switch and service processor module of claim 39, wherein the switch portion and service processor portion are implemented by common hardware within the module.

20 47. The combined switch and service processor module of claim 39, wherein the switch and service processor elements are each operable to create a unique identifier using data unique to the respective processor; and

wherein the service processor element is operable to supply its unique identifier to the switch for use by the switch in identifying itself in precedence to the switch's own unique identifier.

25 48. The combined switch and service processor module of claim 39, wherein the service processor portion is operable to operate in master/slave relationship with a service processor portion of a further combined switch and service processor module of the modular computer system; and

30 wherein the service processor portion is further operable automatically to synchronise management information with the service processor portion of the further combined switch and service processor via the data interface in accordance with the master/slave relationship

49. The combined switch and service processor module of claim 39, wherein the switch and service processor portions are each operable to communicate with the external management entity to obtain a unique address within a computing environment into which the modular computer system is connected.

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50. The combined switch and service processor module of claim 39, further comprising a fault management unit; and wherein the fault management unit is operable to intercept any fault messages generated by the switch portion and the service processor portion and to perform rationalisation processing on those messages  
10 to determine whether to forward a given message to the external management entity.

51. A modular computer system comprising the combined switch and service processor module of claim 39 removably received therein.

15 52. A computer racking system comprising the modular computer system of claim 51.

53. A modular computer system chassis having:  
an aperture for removably receiving therein an information processing  
20 cartridge having at least one processor and a memory;  
an aperture for removably receiving therein the combined switch and service processor module of claim 39; and  
an aperture for removably receiving therein a power supply module.

25 54. A computer racking system comprising the modular computer system chassis of claim 53.

55. A method of operating a combined switch and service processor module for a modular computer system, the combined switch and service processor module comprising: switch portion; a service processor portion having a user interface; and a physical data interface for communicating with an external management entity; the method comprising:  
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operating the service processor portion user interface to receive and forward communications between the external management entity and the switch portion.

56. A combined switch and service processor module for a modular computer  
5 system, comprising:

- a switch including a switch processor;
- a service processor including a service processor processor;
- a data interface for communicating with an external management entity;

10 wherein the switch and service processor are each operable to create a unique identifier using data unique to the respective processor; and

wherein the service processor is operable to supply its unique identifier to the switch for use by the switch in identifying itself in precedence to the switch's own unique identifier.

15 57. The combined switch and service processor module of claim 56, wherein the data unique to the respective processor comprises at least one of production data, production time and serial number.

58. The combined switch and service processor module of claim 56, wherein the  
20 switch is operable to output its own unique identifier upon receipt of a specific request.

59. The combined switch and service processor module of claim 56, wherein the  
unique identifier created by the service processor constitutes an identifier for the  
25 module.

60. The combined switch and service processor module of claim 56, wherein the  
service processor portion has a user interface and wherein the service processor  
portion user interface is operable to receive and forward communications between the  
30 external management entity and the switch portion.

61. The combined switch and service processor module of claim 56, wherein the  
service processor portion is operable to operate in master/slave relationship with a

service processor portion of a further combined switch and service processor module of the modular computer system; and

5       wherein the service processor portion is further operable automatically to synchronise management information with the service processor portion of the further combined switch and service processor via the data interface in accordance with the master/slave relationship

10      62. The combined switch and service processor module of claim 56, wherein the switch and service processor portions are each operable to communicate with the external management entity to obtain a unique address within a computing environment into which the modular computer system is connected.

15      63. The combined switch and service processor module of claim 56, further comprising a fault management unit; and wherein the fault management unit is operable to intercept any fault messages generated by the switch portion and the service processor portion and to perform rationalisation processing on those messages to determine whether to forward a given message to the external management entity.

20      64. A modular computer system comprising the combined switch and service processor module of claim 56 removably received therein.

65. A computer racking system comprising the modular computer system of claim 64.

25      66. A modular computer system chassis having:  
          an aperture for removably receiving therein an information processing cartridge having at least one processor and a memory;  
          an aperture for removably receiving therein the combined switch and service processor module of claim 56; and  
30           an aperture for removably receiving therein a power supply module.

67. A computer racking system comprising the modular computer system chassis of claim 66.

68. A method of operating a combined switch and service processor module for a modular computer system, the combined switch and service processor module having:  
a switch including a switch processor; a service processor including a service  
5 processor processor; and a data interface for communicating with an external  
management entity; the method comprising:

operating each of the switch and service processor to create a unique identifier  
using data unique to the respective processor; and  
operating wherein the service processor to supply its unique identifier to the  
10 switch for use by the switch in identifying itself in precedence to the switch's own  
unique identifier.

69. A combined switch and service processor module for a modular computer system, comprising:

15 a switch portion;  
a service processor portion;  
a data interface for communicating with an external management entity; and  
a fault management unit;  
wherein the fault management unit is operable to intercept any fault messages  
20 generated by the switch portion and the service processor portion and to perform  
rationalisation processing on those messages to determine whether to forward a given  
message to the external management entity.

70. The combined switch and service processor module of claim 69, wherein the  
25 fault management unit is implemented within the service processor portion.

71. The combined switch and service processor module of claim 69, wherein the  
fault management unit stores details of fault messages received irrespective of  
whether the message is forwarded to the external management entity.

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72. The combined switch and service processor module of claim 69, wherein the  
details of the fault messages includes data describing any action taken by the  
originator of the fault message in response to detection of the fault.

73. The combined switch and service processor module of claim 69, wherein the stored details of fault messages are analysed to determine whether any reversement actions are required by the originator of a given fault message when a fault repair is 5 attempted.

74. The combined switch and service processor module of claim 69, wherein the rationalisation processing comprises analysing a received fault message and comparing it to previously received fault messages to determine whether the newly 10 received fault message relates to an already reported fault.

75. The combined switch and service processor module of claim 74, wherein the rationalisation processing further comprises not forwarding a fault message relating to a fault already reported to the management entity where no further details of the fault 15 can be ascertained from the not forwarded message.

76. The combined switch and service processor module of claim 69, wherein the switch portion and service processor portion are implemented by separate hardware within the module. 20

77. The combined switch and service processor module of claim 69, wherein the switch portion and service processor portion are implemented by common hardware within the module.

78. The combined switch and service processor module of claim 69, wherein the service processor portion is operable to operate in master/slave relationship with a service processor portion of a further combined switch and service processor module 25 of the modular computer system; and

wherein the service processor portion is further operable automatically to 30 synchronise management information with the service processor portion of the further combined switch and service processor via the data interface in accordance with the master/slave relationship

79. The combined switch and service processor module of claim 69, wherein the switch and service processor portions are each operable to communicate with the external management entity to obtain a unique address within a computing environment into which the modular computer system is connected

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80. The combined switch and service processor module of claim 69, wherein the service processor portion has a user interface and wherein the service processor portion user interface is operable to receive and forward communications between the external management entity and the switch portion.

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81. The combined switch and service processor module of claim 69, wherein the switch and service processor elements are each operable to create a unique identifier using data unique to the respective processor; and

15       wherein the service processor element is operable to supply its unique identifier to the switch for use by the switch in identifying itself in precedence to the switch's own unique identifier.

82. A modular computer system comprising the combined switch and service processor module of claim 69 removably received therein.

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83. A computer racking system comprising the modular computer system of claim 82.

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84. A modular computer system chassis having:  
an aperture for removably receiving therein an information processing cartridge having at least one processor and a memory;  
an aperture for removably receiving therein the combined switch and service processor module of claim 69; and  
an aperture for removably receiving therein a power supply module.

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85. A computer racking system comprising the modular computer system chassis of claim 84.

86. A method of operating a combined switch and service processor module for a modular computer system, the combined dswitch and service processor module having: a switch portion; a service processor portion; a data interface for communicating with an external management entity; and a fault management unit; the method comprising:

5           operating the fault management unit to intercept any fault messages generated by the switch portion and the service processor portion and to perform rationalisation processing on those messages to determine whether to forward a given message to the external management entity.

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